PHYSICS

Physics Department (http://www.csuchico.edu/physics/)
Science Building 257A
530-898-6259
Email: phys@csuchico.edu
Chair: David Brookes

Insight

The Department of Physics offers excellent education in the field of physics. Whether your career goal is teaching, working in technology or scientific research, or daring to make the next great breakthrough in our understanding of the universe, we offer a physics degree tailored to your dreams.

Experience

Our goal is to provide the best undergraduate education in physics. By choice, we don’t have a graduate program! Instead, we are focused on our undergraduates. All of our classes are taught by professors selected for their commitment to quality teaching. No massive lecture halls full of stadium seating in this major; instead, your core physics courses are capped at 36 seats. This allows for quality mentorship and individualized instruction.

We offer hands-on research, both during the school year and during our Physics Summer Research Investigations (PSRI) program. Current research experiences available to our students include instrumentation development, stellar formation, femtosecond spectroscopy, ultra-cold atoms, lasers and optics, quantum sensing, and computational modeling of the solar interior.

We have an active Society of Physics Students chapter and a brand-new science building.

Outlook

Our students go on to careers in research, teaching, industry, programming, entrepreneurship—want specifics? Look at any cell tower. See devices with a lightning-bolt logo? That company was started by a California State University, Chico physics grad. Another recent graduate built a lab company that tests commercial devices for (UL) certification. Another does massively-parallel computation development for Nvidia.

We regularly have students go on to doctoral work at major universities, and our campus is the primary source of high school science teachers for the entire Northern California.

Programs

Undergraduate

Bachelor’s

• Physics BS (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/physics/physics-bs/)

Minors

• Astronomy Minor (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/physics/astronomy-minor/)
• Physics Minor (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/physics/physics-minor/)

Credentials


See Course Description Symbols and Terms (https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/) for an explanation of course description terminology and symbols, the course numbering system, and course credit units.

PHYS 100 Introduction to Astronomy: Survey of the Cosmos

Typically Offered: Fall and spring
This course provides an overview of modern physical theory, emphasizing the approach of science in understanding our place in the universe. The student discovers how simple, fundamental physical principles enable us to understand key features in diverse physical systems: from the radiometric dating of early hominid ancestors to the measurement of the expansion rate of the Universe. The course emphasizes our current understanding of astronomy, solar system formation, stellar evolution, and cosmic evolution. This in turn leads us to investigate the physical conditions salient to life on Earth, and ways in which these conditions are ‘rare’. 2 hours activity, 2 hours discussion. (007392) General Education: Laboratory Activity (B3); Physical Science (B1) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Lower Division

PHYS 102 Thinking Like a Physicist

Prerequisite: Recommended: For students who have not met other PHYS 202A prerequisites such as MATH 118 or High school trigonometry.
Corequisites: PHYS 202A.
Typically Offered: Fall and spring
This course provides the math and trigonometry background necessary for success in introductory physics. Specifically designed to be taken alongside PHYS 202A for students who have not met other PHYS 202A prerequisites such as MATH 118 or High school trigonometry. 1 hour lecture. (021291) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 1 unit Course Attributes: Lower Division

PHYS 109 Paths to Success in Physics

Typically Offered: Fall only
A university success course for physics majors new to California State University, Chico. Appropriate for all incoming freshman and transfer students. This course explores academic and career opportunities in physics and related fields, introduces current topics in physics, acquaints students with resources available on campus and provides an introduction to physics research. 1 hour discussion. (021671) Grade Basis: Graded Repeatability: You may take this course for a maximum of 1 unit Course Attributes: Lower Division
PHYS 202A General Physics I 4 Units GE
Prerequisite: High school physics; High school trigonometry, and second-year high school algebra or MATH 118; or concurrent enrollment in PHYS 102.
Typically Offered: Fall and spring
Mechanics, properties of matter, wave motion, sound, heat. Science majors are encouraged to take PHYS 204A instead of this course. 3 hours discussion, 3 hours laboratory. (007394)
General Education: Laboratory Activity (B3); Physical Science (B1)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 202B General Physics II 4 Units
Prerequisite: PHYS 202A with a grade of C- or higher.
Typically Offered: Fall and spring
Light, electricity, magnetism, selected topics in modern physics. Science majors are encouraged to take PHYS 204B instead of this course. Algebra and trigonometry are used. 3 hours discussion, 3 hours laboratory. (007395)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 202X Physics Problem Session 1 Unit
Prerequisite: Concurrent enrollment in PHYS 202A.
Typically Offered: Fall and spring
Designed to supplement PHYS 202A with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007398)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 202Y Physics Problem Session 1 Unit
Corequisites: PHYS 202B.
Typically Offered: Fall and spring
Designed to supplement PHYS 202B with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007399)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 204A Physics for Students of Science and Engineering: Mechanics 4 Units GE
Prerequisite: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.
Typically Offered: Fall and spring
Vectors, kinematics, particle dynamics, friction, work, energy, power, momentum, dynamics and statics of rigid bodies, oscillations, gravitation, fluids. Calculus used. A grade of C- or higher is required before progressing to either PHYS 204B or PHYS 204C. 3 hours discussion, 3 hours laboratory. (007401)
General Education: Laboratory Activity (B3); Physical Science (B1)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 204B Physics for Students of Science and Engineering: Electricity and Magnetism 4 Units
Prerequisite: MATH 121, PHYS 204A with a grade of C- or higher.
Typically Offered: Fall and spring
Charge and matter, electric field, Gauss' law, electric potential, capacitors and dielectrics, current and resistance, magnetic field, Ampere's law, Faraday's law of induction, magnetic properties of matter, electromagnetic oscillations and waves. Calculus used. 3 hours discussion, 3 hours laboratory. (007402)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 204C Physics for Students of Science and Engineering: Heat, Wave Motion, Sound, Light, and Modern Topics 4 Units
Prerequisite: MATH 121, PHYS 204A with a grade of C- or higher.
Typically Offered: Fall and spring
Temperature, first and second law of thermodynamics, and kinetic theory. Waves in elastic media, standing waves and resonance, and sound. Ray and wave optics, reflection, refraction, lenses, mirrors, diffraction, and polarization. Selected topics in modern physics. Calculus used. 3 hours discussion, 3 hours laboratory. (007403)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 204X Physics Problem Session 1 Unit
Corequisites: PHYS 204A.
Typically Offered: Fall and spring
Designed to supplement PHYS 204A with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007406)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 204Y Physics Problem Session 1 Unit
Corequisites: PHYS 204B.
Typically Offered: Fall and spring
Designed to supplement PHYS 204B with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007407)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 298 Special Topics 1-3 Units
Prerequisite: Department permission.
Typically Offered: Fall and spring
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 3 hours supervision. (007412)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Lower Division
PHYS 300  Introduction to Modern Physics: Relativity and Quantum Theory  3 Units
Prerequisite: PHYS 204A, PHYS 204B, PHYS 204C, or PHYS 202A and PHYS 202B and calculus with faculty permission.
Typically Offered: Fall only
This course focuses on the radical changes in our conception of the physical world that emerged in the early 20th and 21st centuries. The course begins with the theory of special relativity, which altered our understanding of the nature of space, time, matter, and energy. The course's middle section is devoted to the introduction of quantum theory. The last section introduces particle physics, general relativity, and cosmology. 2 hours activity, 2 hours discussion. (007417)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 301  Analytical Mechanics  3 Units
Prerequisite: PHYS 204B, PHYS 204C, PHYS 314 (may be taken concurrently).
Typically Offered: Fall only
Newton's laws of motion, particle dynamics, accelerated reference systems, central force problems, conservation laws, celestial mechanics, many body systems, rotational motion, rigid body dynamics, Euler's equations, Lagrange's and Hamilton's formulations, oscillating systems, and waves. 3 hours discussion. (007419)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 302  Electricity and Magnetism  3 Units
Prerequisite: PHYS 204C, PHYS 314.
Typically Offered: Spring only
Vector analysis; electrostatic fields and potentials; Poisson's equation, boundary value problems and multipole expansions; dielectrics, magnetostatics, magnetic fields in matter, Maxwell's equations, field energy and momentum, Fresnel equations, propagation of electromagnetic waves in dispersive media, waveguides and coaxial cables, radiating systems. 3 hours discussion. (007422)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 307  Physics of Music  3 Units GE
Prerequisite: GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Physical Sciences (B1); GE Life Sciences (B2); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
This course is intended for non-science majors and explores the deep connection between physics and music. Basic principles of physics and scientific reasoning are taught in the context of the production and perception of music, emphasizing the historic and scientific interplay between physics and music. No previous knowledge of physics or music is assumed. Through learning the physical concepts used to describe music, students are able to extend their understanding to additional examples of physical phenomena. 2 hours activity, 2 hours lecture. (021877)
General Education: Upper-Division Scientific Inq/Quant Reason (UDB); Innovation, Design, and the Arts Pathway; Science, Technology, and Society Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 309  Physics Associates Program  1 Unit
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
The course provides two hours/week of physics tutoring. 2 hours activity. (007429)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

PHYS 312  Computational Physics  3 Units
Prerequisite: PHYS 204B.
Corequisites: PHYS 204C.
Typically Offered: Spring only
This course prepares physics majors to be self-sufficient in personal computer use to solve experimental and theoretical physics problems. Topics include, but are not limited to, analysis of experimental data, projectile motion, random processes, vector fields and potentials, vibrating systems, and electric circuits. 2 hours discussion, 3 hours laboratory. (007411)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 314  Methods of Theoretical Physics  3 Units
Prerequisite: MATH 220, MATH 260, PHYS 204B.
Typically Offered: Fall only
This course provides students with the skills needed to apply advanced topics in mathematics to upper-division physics problems. It focuses on applications of calculus, multi-variable calculus, differential equations, linear algebra, Fourier techniques, partial differential equations, and boundary-value problems to physics problems in classical mechanics, EM, and other advanced physics courses. 3 hours lecture. (022045)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 315  Thermal Physics  3 Units
Prerequisite: PHYS 300. Recommended: MATH 361.
Typically Offered: Spring only
This course develops the laws of macroscopic equilibrium thermodynamics along with applications to representative physical problems. The course concludes with an investigation of the microscopic statistical properties underlying these laws. 3 hours discussion. (021447)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 327  Electronics for Scientists  4 Units
Prerequisite: PHYS 204B, PHYS 204C.
Typically Offered: Spring only
This course is an introduction to basic laboratory electronics for scientists. Topics include fundamentals of linear and non-linear circuit elements, operational amplifiers, simple digital circuits, A/D and D/A conversion, noise reduction, introductory-level LabVIEW programming, and an introduction to microcontroller systems. A weekly three hour lab gives students experience in designing, building, and debugging circuitry for laboratory/control tasks. 3 hours laboratory, 3 hours lecture. (021423)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division
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<td>PHYS 341</td>
<td>Advanced Inquiry into Physics</td>
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<td>Phys 141; or Phys 100; or PHYS 202A and PHYS 202B; or PHYS 204A, PHYS 204B, and PHYS 204C.</td>
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<td>PHYS 361</td>
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<td>PHYS 365</td>
<td>Astronomy - Galaxies and Cosmology</td>
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<tr>
<td>PHYS 376W</td>
<td>Physics for Future World Leaders (W)</td>
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<td>Phys 141; GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.</td>
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<td>PHYS 398</td>
<td>Special Topics</td>
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<td>GE Written Communication (A2) requirement, PHYS 200, PHYS 202B.</td>
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<td>Quantum Mechanics I</td>
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<td>PHYS 450</td>
<td>Optics</td>
<td>3</td>
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PHYS 451  Lasers and Their Applications  3 Units
Prerequisite: PHYS 204C. Recommended: EECE 450 or PHYS 450.
Typically Offered: Spring only
The theory and mechanism of laser action, various types of lasers and their applications and future use. Laboratory involves measurements with lasers, fiber optics, data transmission, and holography. 2 hours discussion, 3 hours laboratory. (002550)
Cross listing(s): EECE 451
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 489P  Internship in Professional Physics  3 Units
Prerequisite: PHYS 300 and faculty permission.
Typically Offered: Fall and spring
This is a supervised internship in professional physics. This internship may take place at a university, government laboratory, or private sector company. This course may be taken more than once. It cannot be used for the minor in physics. 9 hours supervision. (007447)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 15 units
Course Attributes: Upper Division

PHYS 489T  Internship in Physics Teaching  3 Units
Prerequisite: PHYS 327 and faculty permission.
Typically Offered: Fall and spring
This is a supervised internship in physics teaching which will take place in a local high school physics classroom. This course may be taken more than once, but a maximum of 3 units of any PHYS 289 may be counted toward the degree. This course cannot be used for the minor in physics. 9 hours supervision. (007448)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 15 units
Course Attributes: Upper Division

PHYS 492W  Communicating Physics (W)  3 Units
Prerequisite: GE Written Communication (A2) requirement, junior standing, open to Physics majors only.
Typically Offered: Spring only
Presentation and discussion of current physics literature and/or special studies of students and faculty, in professional journal form, other written forms, and in seminar presentation. 2 hours discussion, 1 hour seminar. (022057)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division, Writing Course

PHYS 498  Special Topics  1-3 Units
Prerequisite: Upper-division standing in physics, faculty permission.
Typically Offered: Inquire at department
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 1 hour seminar. (007460)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

PHYS 499  Special Problems  1-3 Units
Typically Offered: Fall and spring
This course is an independent study of special problems and is offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 3 hours supervision. (007451)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

PHYS 499H  Honors Research Project  3 Units
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
Open by invitation to physics majors who have a GPA of 3.5 or higher. This is an "Honors in the Major" course. 9 hours supervision. (022533)
Grade Basis: ABC/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

PHYS 697  Independent Study  1-4 Units
Typically Offered: Fall and spring
This course is a graduate-level independent study offered for 1.0-4.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007456)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

PHYS 699T  Master's Thesis  1-6 Units
Typically Offered: Fall and spring
This course is offered for up to 6.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007460)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

Physics Department
The Faculty
Paul C Arpin  2014
Associate Professor
Doctor of Philosophy Univ Of Colorado At Boulder

Eric J Ayars  2003
Professor
Doctor of Philosophy North Carolina St Univ At Raleigh

Rose Bourdet  2021
Lecturer

David T Brookes  2015
Chair
Doctor of Philosophy Rutgers Univ New Brunswick

Kendall P Hall  2021
Assistant Professor
Doctorate Univ Of Wisconsin-Madison

Yuhfen Lin  2016
Lecturer
Doctor of Philosophy Ohio St Univ Main Campus

Nicholas J Nelson  2015
Associate Professor
Doctor of Philosophy Univ Of Colorado At Boulder

Hyewon K Pechkis  2016
Associate Professor
Doctor of Philosophy Univ Of Connecticut

**Joseph A Pechkis** 2016
Assistant Professor
Doctor of Philosophy Univ Of Connecticut

**Anna I Petrova-Mayor** 2008
Professor
Doctor of Philosophy University of Hohenheim

**Mahendra B Thapa** 2016
Lecturer
Doctor of Philosophy Univ Of Cincinnati Main Campus

### Emeritus Faculty

**Louis J Buchholtz**
Emeritus
Doctor of Philosophy Stanford Univ

**Cheuk K Chau** 1975
Emeritus
Doctor of Philosophy Univ Of Illinois Urbana Campus

**Eric R Dietz** 1983
Emeritus
Doctor of Philosophy Univ Of Cal-Berkeley

**Christopher A Gaffney**
Emeritus
Doctor of Philosophy Univ Of Notre Dame

**David T Kagan**
Emeritus
Doctor of Philosophy Univ Of Cal-Berkeley

**Lynda M Klein**
Emeritus
Master of Science Univ Of Cincinnati Main Campus

**Lorin E Millet** 1967
Emeritus
Doctor of Philosophy Brigham Young Univ

**Robert L Paulson**
Emeritus
Doctor of Philosophy Univ Of Cal-Davis

**John C Young** 1970
Emeritus
Doctor of Philosophy Univ Of Cal-Davis

**Xue Li Zou**
Emeritus
Doctor of Philosophy Ohio St Univ Main Campus